4.5 AIR QUALITY

This section includes an assessment of impacts of the proposed DMP Update project components on air quality within Carlsbad.

4.5.1 Existing Conditions

4.5.1.1 Environmental Setting, Climate, and Meteorology

Carlsbad is located within the San Diego Air Basin (SDAB), which is geographically defined by the borders of San Diego County. The climate of San Diego County is generally characterized by warm, dry summers and mild, wet winters. One of the main determinants of the regional climatology is a semipermanent high-pressure area in the eastern Pacific Ocean (the Pacific High). In the summer, this pressure center is located well to the north, causing storm tracks to be directed north of California and maintaining clear skies in southern California for much of the year. When the Pacific High moves southward during the winter, this pattern changes, and low-pressure storms are brought into the region, causing widespread precipitation. In San Diego County, the heaviest precipitation typically occurs in October through March and averages approximately 9 to 14 inches annually. The mean temperature within the county is 62.2 degrees Fahrenheit (°F), while the mean maximum and mean minimum temperatures are 75.7°F and 48.5°F, respectively.

A common atmospheric condition known as a temperature inversion affects air quality in San Diego County. Inversion layers are important elements of local air quality because they inhibit the dispersion of pollutants, thus resulting in a temporary degradation of air quality. Subsidence inversions occur during the warmer months (May through October) as descending air associated with the Pacific High comes into contact with cool marine air. During an inversion, air temperatures increase with increasing height, causing pollutants to become trapped in the dense, cool air below. The inversion layer is generally located approximately 2,000 feet above mean sea level during the months of May through October. During the winter months (November through April), the temperature inversion boundary increases to approximately 3,000 feet above mean sea level.

4.5.1.2 Applicable Regulations, Plans, and Policies

Federal and State Standards

The Federal Clean Air Act (CAA) (USC Section 7401) required the adoption of National Ambient Air Quality Standards (NAAQS) to protect the public health, safety, and welfare from known or anticipated effects of air pollution. The NAAQS have been occasionally updated, and current national standards are set for sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), respirable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and lead. Pollutants with established NAAQS are collectively referred to as criteria pollutants. The State of California Air Resources Board (CARB) has established the California Ambient Air Quality Standards (CAAQS), which are generally more restrictive than the NAAQS. Federal and state standards are shown in Table 4.5-1.

On June 15, 2005, the USEPA revoked the federal one-hour O_3 standard for all areas except those designated as "Early Action Compact Areas" (EACs). EACs are areas that do not have an effective date for the federal 8-hour O_3 designation. No EAC occurs within California thus the federal 1-hour O_3 is effectively revoked in the state.

Regional Standards

In San Diego County, the San Diego Air Pollution Control District (SDAPCD) is the agency responsible for protecting public health and welfare through the administration of federal and state air quality laws and policies. Included in the SDAPCD's tasks are the monitoring of air pollution, the preparation of the San Diego County portion of the State Implementation Plan (SIP), and the promulgation of Rules and Regulations. The SIP includes strategies and tactics to be used to attain and maintain acceptable air quality in the county; this list of strategies is called the Regional Air Quality Strategy (RAQS). The Rules and Regulations include procedures and requirements to control the emission of pollutants and prevent significant adverse impacts to sensitive receptors.

One rule particularly applicable to the proposed DMP Update is SDAPCD Rule 51, Nuisance. Rule 51 states, in part, that "a person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such persons or the public or which cause or have a natural tendency to cause injury or damage to business or property."

Table 4.5-1
National and California Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS[1]		CAAQS[2]
		Primary[3]	Secondary[4]	Concentration[5]
Ozone (O_3)[6]	1-Hour	-	-	0.09 ppm (180 µg/m^3)
	8-Hour	0.08 ppm (157 µg/m^3)	Same as Primary Standard	0.070 ppm (137 µg/m^3) [9]
Carbon Monoxide (CO)	8-Hour	9.0 ppm (10 mg/m^3)	None	9.0 ppm (10 mg/m^3)
	1-Hour	35 ppm (40 mg/m^3)		20 ppm (23 mg/m^3)
Nitrogen Dioxide (NO_2)	Annual Average	0.053 ppm (100 µg/m^3)	Same as Primary Standard	-
	1-Hour	-		0.25 ppm (470 µg/m^3)
Sulfur Dioxide (SO_2)	Annual Average	0.03 ppm (80 µg/m^3)	-	-
	24-Hour	0.14 ppm (365 µg/m^3)	-	0.04 ppm (105 µg/m^3)
	3-Hour	-	0.5 ppm (1300 µg/m^3)	-
	1-Hour	-	-	0.25 ppm (655 µg/m^3)
Suspended Particulate Matter (PM_{10})	24-Hour	150 µg/m^3	-	50 µg/m^3
	Annual Arithmetic Mean	50 µg/m^3	Same as Primary Standard	20 µg/m^3 note 7
Fine Particulate Matter ($PM_{2.5}$)[6]	24-Hour	65 µg/m^3	-	-
	Annual Arithmetic Mean	15 µg/m^3	Same as Primary Standard	12 µg/m^3 note 7
Lead (Pb)[8]	30-Day Average	-	-	1.5 µg/m^3
	Calendar Quarter	1.5 µg/m^3	Same as Primary Standard	-
Hydrogen Sulfide (HS)	1-Hour	No Federal Standards		0.03 ppm (42 µg/m^3)
Sulfates (SO_4)	24-Hour			25 µg/m^3
Visibility Reducing Particles	8-Hour (10 am to 6 pm, Pacific Standard Time)			In sufficient amount to produce an extinction coefficient of 0.23 per km due to particles when the relative humidity is less than 70 percent.
Vinyl chloride[8]	24-Hour			0.01 ppm (26 µg/m^3)

[1] NAAQS (other than O_3, particulate matter, and those based on annual averages or annual arithmetic mean) are not to be exceeded more than once a year. The O_3 standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. For PM_{10}, the 24-hour standard is not to be exceeded more than once per year. The annual standard is attained when the 3-year average of the weighted annual mean at each monitor within an area does not exceed 50 µg/m^3. For $PM_{2.5}$, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, do not exceed 65 µg/m^3. The annual standard is attained when the 3-year average of the weighted annual mean at single or multiple community-oriented monitors does not exceed 15 µg/m^3.

[2] California Ambient Air Quality Standards for O_3, CO (except Lake Tahoe), SO_2 (1- and 24-hour), NO_2, PM_{10}, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded.

[3] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[4] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[5] Concentration expressed first in units in which it was promulgated. Ppm in this table refers to ppm by volume or micromoles of pollutant per mole of gas.

[6] The federal 1-hour O_3 standard was revoked for most areas of the United States, including all of California on 15 June 2005.

[7] On 5 June 2003, the Office of Administrative Law approved the amendments to the regulations for the state ambient air quality standards for particulate matter and sulfates. Those amendments established a new annual average standard for $PM_{2.5}$ of 12 µg/m^3 and reduced the level of the annual average standard for PM_{10} to 20 µg/m^3. The approved amendments were filed with the Secretary of State on 5 June 2003. The regulations became effective on 5 July 2003.

[8] The CARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[9] Effective May 17, 2006.

ppm = parts per million; µg/m^3 = micrograms per cubic meter; mg/m^3 = milligrams per cubic meter; km = kilometer
Source: CARB 2005a; USEPA 2005

4.5.1.3 Program Level

Regional Air Quality

Specific geographic areas are classified as either "attainment" or "nonattainment" areas for each pollutant based on the comparison of measured data with federal and state standards. If an area is redesignated from nonattainment to attainment, the CAA requires a revision to the SIP, and the preparation of a maintenance plan. The maintenance plan is required to demonstrate how the air quality standard will be maintained for at least 10 years.

The SDAB currently meets the federal standards for all criteria pollutants except O_3 and meets state standards for all criteria pollutants except O_3, $PM_{2.5}$, and PM_{10}. San Diego County completed 3 years within the federal 1-hour O_3 standard on November 15, 2001, becoming eligible for redesignation as an attainment area. Formal redesignation by the USEPA as an O_3 attainment area occurred on July 28, 2003, and a maintenance plan was approved. On April 15, 2004, the USEPA issued the initial designations for the 8-hour O_3 standard, and the SDAB is classified as "basic" nonattainment. Basic is the least severe of the six degrees of O_3 nonattainment. The SDAPCD must submit an air quality plan to the USEPA in 2007; the plan must demonstrate how the 8-hour O_3 standard will be attained by 2009 (SDAPCD 2004). While the federal 1-hour O_3 standard has been repealed, the maintenance plan will remain in effect until the 8-hour O_3 plan has been approved by the USEPA.

The SDAB is currently classified as a state "serious" O_3 nonattainment area and a state nonattainment area for PM_{10}. For $PM_{2.5}$, the SDAB is currently classified as a state nonattainment area. The SDAB currently falls under a federal "maintenance plan" for CO, following a 1998 redesignation as a CO attainment area.

Ambient air pollutant concentrations in the SDAB are measured at 10 air quality monitoring stations operated by the SDAPCD. The closest SDAPCD air quality monitoring station to the project site is the Del Mar-Mira Costa College monitoring station located at 225 Ninth Street, Del Mar, approximately 13 miles south of Carlsbad. The Del Mar-Mira Costa College monitoring station is representative for coastal environments. The Del Mar station monitors O_3 (Table 4.5-2). No other monitoring stations are located close enough to Carlsbad to be used to characterize other criteria pollutants such as CO, PM_{10}, and $PM_{2.5}$ in a coastal environment. Table 4.5-2 summarizes the exceedances of standards and the highest O_3 levels recorded at this station for the years 2001 to 2005.

Table 4.5-2
Ambient Air Quality Summary for Mira Costa Monitoring Station, Del Mar

Pollutant	Averaging Time	California Air Quality Standards	Federal Primary Standards	Maximum Concentrations[1]					Number of Days Exceeding Federal Standard[2]					Number of Days Exceeding State Standard[2]				
				2001	2002	2003	2004	2005	2001	2002	2003	2004	2005	2001	2002	2003	2004	2005
Ozone	1-hour	0.09 ppm	0.12 ppm	0.135	0.112	0.107	0.105	0.082	1	0	0	0	0	9	3	2	6	0
	8-hour	none	0.08 ppm	0.094	0.090	0.083	0.087	0.070	1	1	0	2	0	–	–	-	-	-

"–" = data not available or applicable.
(1) Concentration units for ozone are in parts per million (ppm).
(2) For annual standards, a value of 1 indicates that the standard has been exceeded.

Source: CARB 2006a

Sources of Regional Pollution

Table 4.5-3 shows the estimated quantities of pollutant emissions in the SDAB in 2004. The most significant regional sources of PM_{10} and $PM_{2.5}$ are construction and demolition and dust from vehicle use on paved and unpaved roads, which accounted for 67 percent of the estimated emissions in San Diego County. Coarser particles are directly emitted from activities that disturb the soil, including entrained dust from travel on paved and unpaved roads, construction, mining, and agricultural operations. Other sources include windblown dust, pollen, salts, brake dust, and tire wear. The most significant regional sources of O_3, NO_2, and CO, are automobiles and other on-road vehicles. O_3 is formed by the reaction of reactive organic gases (ROG) and oxides of nitrogen (NO_X), which are combustion products from gas and diesel engines. Other important sources of ROG are paints, coatings, and process solvents. Combustion sources like vehicles, diesel engines, and industrial facilities also emit the fine particulate matter, PM_{10} and $PM_{2.5}$.

Table 4.5-3
2004 Estimated Annual Average Emissions - San Diego Air Basin

	Annual Emissions – Tons per day					
	PM_{10}	**$PM_{2.5}$**	**CO**	**SO_X**	**ROG**	**NO_X**
Stationary Sources	8.0	6.4	31.8	0.5	54.2	9.4
Areawide Sources	97.6	27.0	67.8	0.3	40.7	3.0
Mobile Sources	10.5	8.6	931.9	2.2	100.2	171.6
Natural Sources	13.9	11.8	137.6	1.3	76.1	4.2
Total	**130.0**	**53.8**	**1,169.1**	**4.3**	**271.2**	**188.2**

Source: CARB 2006b

Table 4.5-4 shows the forecast quantities of pollutant emissions in the SDAB in 2020. Significant reductions in ROG, NO_X, and CO emissions are forecast for on-road and off-road vehicles, while there would be increases in emissions from stationary and areawide sources.

Sensitive Receptors

Sensitive land uses are defined as locations where people reside or where the presence of pollutant emissions could adversely affect existing or proposed land use. Typical sensitive receptors include residents, schoolchildren, hospital patients, and the elderly. Carlsbad encompasses a number of facilities that provide services to such receptors, including parks, hospitals, day care centers, and senior facilities. These are located at various locations throughout the city.

Table 4.5-4
2020 Forecast Annual Average Emissions - San Diego Air Basin

	Annual Emissions – Tons per day					
	PM_{10}	$PM_{2.5}$	CO	SO_X	ROG	NO_X
Stationary Sources	12.5	10.5	53.3	0.6	77.4	13.7
Areawide Sources	115.5	31.3	74.9	0.3	46.5	3.1
Mobile Sources	11.3	9.1	473.6	11.6	48.7	90.0
Natural Sources	13.9	11.8	137.6	1.3	76.1	4.2
Total	**153.2**	**62.7**	**739.40**	**13.8**	**248.7**	**111.0**

Source: CARB 2006b

4.5.1.4 Project Level

Sources of Emissions

The principal sources of emissions in and near Agua Hedionda and Calavera creeks (project components B and BN) are vehicles on El Camino Real and Cannon Road. Other sources include agricultural machinery and operations. Vehicle travel on unpaved roads and agricultural operations are sources of particulate emissions. Emissions associated with unpaved roads and agricultural operations are anticipated to decrease as the area becomes more urbanized.

Sensitive Receptors

Agua Hedionda and Calavera creeks are located adjacent to the Rancho Carlsbad residential community, which includes elderly residents. There are no schools or health care facilities near the project area.

4.5.2 Significance Criteria

The proposed DMP Update components would result in potentially significant impacts to air quality if they would:

- conflict with or obstruct implementation of the RAQS;
- violate the NAAQS or CAAQS or contribute substantially to an existing or projected air quality violation;
- violate thresholds established by the USEPA, as shown in Section 4.5.3.2 below;

- result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for O_3 precursors);
- expose sensitive receptors to substantial pollutant concentrations; or
- expose sensitive receptors to objectionable odors for more than a 1-week period.

4.5.3 Impact Analysis

4.5.3.1 Program Level

The principal sources of gaseous emissions and some particulate emissions associated with implementation of the DMP Update components would be the engine exhaust of diesel engine-driven construction equipment, including bulldozers, cranes, backhoes, heavy trucks, and paving equipment. Trucks would be used to haul demolished and excavated materials off-site, and to bring new pipelines, concrete, riprap, and other materials to the site. Principal sources of particulate emissions would be grading and soil disturbance, and vehicle operations on unpaved and paved surfaces.

Emissions would be minimized by the implementation of standard design and construction practices. For example, water and dust control agents would be applied to active grading areas, unpaved surfaces, and dirt stockpiles to prevent or suppress airborne particulates. Trucks and equipment would not idle for more than 15 minutes when not in service. Air filters and other pollution control devices on construction equipment would be properly operated and maintained. Measures such as these and others included in Table 3-6 would minimize particulate emissions during construction activity. Potential impacts would be less than significant.

There would be a potential for emissions of odors from disturbance of wet sediments or from paving activities. If these odors occurred, they would dissipate relatively rapidly and would not be anticipated to be noticeable for more than 1 week. Potential impacts would be less than significant.

With the implementation of the identified standard design and construction practices, emissions would not be of a magnitude to conflict with existing attainment and maintenance plans, violate air quality standards, or make a considerable contribution to the existing regional pollutant concentrations. The construction and operations activities would not expose sensitive receptors

to substantial pollutant concentrations, nor would there be objectionable odors that would affect sensitive receptors for an extended period of time. Potential impacts would be less than significant.

4.5.3.2 Operation and Maintenance

Operation and maintenance of existing and proposed drainage facilities would require the use of various pieces of construction equipment and trucks for cleaning channels, repairing culverts, replacing bridges, and other activities as described in Section 3.3.6. Emissions would be minimized by the implementation of project design features/methods and construction practices described above for PLDA and non-PLDA projects and included in Table 3-6. Potential impacts would be less than significant.

With the implementation of the identified standard design and construction practices, emissions would not be of a magnitude to conflict with existing attainment and maintenance plans, violate air quality standards, or make a considerable contribution to the existing regional pollutant concentrations. The construction and operations activities would not expose sensitive receptors to substantial pollutant concentrations, nor would there be objectionable odors that would affect a substantial number of people. Potential impacts would be less than significant.

4.5.3.3 Project Level

PLDA Project Components

Air emissions resulting from implementation of the proposed drainage improvements in Agua Hedionda and Calavera creeks (PLDA components B and BN) were estimated by use of the URBEMIS 2002 software package, version 8.7 (CARB 2005b). URBEMIS is a calculation tool designed to estimate air emissions from land use development projects based on development type and size. The model contains data that are specific for each California air basin. Data relevant to the proposed DMP Update are based on the project elements and schedule described in Section 3.3 of this EIR. URBEMIS data sheets are attached as Appendix C.

For purposes of estimating emissions, it was assumed that the project would last for 4 to 6 months (see Chapter 3.0 [Project Description]). During that period, construction equipment operations would be the equivalent of one bulldozer, two loader/backhoes, and two heavy trucks operating for the entire period, and one scraper and one crane operating for 75 percent of the period. It was also assumed that 30,000 cy of dredged and excavated materials would be hauled

off-site (with up to 28,000 cy potentially transported to the South Carlsbad beach replenishment site). The estimated emissions are shown in Table 4.5-5.

Table 4.5-5
Estimated Construction Emissions

	tons/year			
	ROG	**NO_X**	**CO**	**PM_{10}**
Construction emissions	1.0	6.7	7.9	0.5[1]
Guidance Thresholds	*100*	*100*	*100*	*70*

[1] PM_{10} emissions would be 0.4 ton with watering of active grading surfaces when required, which is included in standard construction practices.

Source: USEPA 1993

The SDAPCD has no quantitative emissions criteria for CEQA evaluations. Therefore, for guidance, the thresholds used for assessment of conformity of federal projects to the state air quality plans were used and are shown in Table 4.5-5 (USEPA 1993). As shown in Table 4.5-5, estimated project emissions are considerably less than the threshold values.

There would be a potential for odor emissions from the dredging and removal of wet sediments from the creek channels. The duration of odor would be limited to the time required to remove the odorous materials or for the odor emissions to be minimized by drying of the materials. Potential air quality impacts associated with stockpiles of dredge material would be minimized with implementation of the project design features/measures and construction practices identified in Table 3-6, and would be similar to those described under the program level analysis.

Estimated emissions would be less than 8 percent of the guidance emissions thresholds. Thus, emissions would not be of a magnitude to conflict with existing attainment and maintenance plans, violate air quality standards, or make a considerable contribution to the existing regional pollutant concentrations. The construction activities would not expose sensitive receptors to substantial pollutant concentrations, nor would there be objectionable odors that would affect sensitive receptors over more than a 1-week period. Potential air quality impacts would be less than significant.

Non-PLDA Project Components

The improvements to Agua Hedionda and Calavera creeks would involve long-term maintenance efforts (non-PLDA project components B and BN). Similar to the PLDA components, the principal sources of emissions would be construction equipment. The intensity and duration of operations would be less than for the construction efforts, and emissions would be less than shown in Table 4.5-5. Potential air quality impacts would be less than significant.

4.5.4 Significance of Impacts

4.5.4.1 Program Level

No direct or indirect potentially significant short- or long-term air quality impacts would occur with implementation of the program level DMP Update components.

4.5.4.2 Operation and Maintenance

No direct or indirect potentially significant short- or long-term air quality impacts would occur during proposed operation and maintenance activities.

4.5.4.3 Project Level

No direct or indirect potentially significant short- or long-term air quality impacts would occur with implementation of the project level DMP Update components.

4.5.5 Mitigation Measures

4.5.5.1 Program Level

No potentially significant impacts were identified, and no mitigation measures would be required.

4.5.5.2 Operation and Maintenance

No potentially significant impacts were identified, and no mitigation measures would be required.

4.5.5.3 Project Level

No potentially significant impacts were identified, and no mitigation measures would be required.